

by their irregularity, that all organic origin is excluded, sometimes in ice; they originate in the hardening together of crystals, under pressure, and are only the imprisoned, often stem-like and branched hollows of air. Like Eozoon they become afterwards filled with foreign matter, with serpentine and chrysotile, resulting out of the watery decomposition of olivine.

To show how analogous circumstances are also applicable to the origin of Eozoon, I shall first refute the two erroneous arguments often adduced for the organic existence in the Laurentian period: the presence of graphite and the stratification of the oldest rocks.

Graphite, as Dr. Moebius supposes, cannot be a sign of primitive organic life. (1) In the oldest period there certainly lived only the most primitive lower beings, which without exception decay rapidly, and are therefore not able to furnish coal. (2) Graphite is sometimes a substitute of mica in the Gneiss; if it be phytogen, the synchronous quartz and feldspar, &c., must also be declared so; but that is absurd. (3) We always get amorphous coal out of organic beings, and by chemical process in the cold way, and on the contrary crystallised coal, i.e. graphite, is only to be produced by heat, and in several ways, even out of gases. We must regard graphite as one of the arguments, proving the incandescent origin of the oldest rocks. Out of each kind of coal, also of graphite, bitumen can originate, so that bitumen is not always a sure proof of organic beings. (4) There exist many other facts proving the incandescent origin of Laurentian minerals; I will add, as I believe, a new one. This origin excludes at the same time any living beings. Not one original mineral of the Laurentian minerals contains water, only mica contains a very small proportion, but this chemically combined, for it cannot be expelled at red-heat. If these minerals had not had their origin in heat, they would sometimes contain water.

The other fallacious proof for the neptunic origin of Laurentian rocks is their occasional stratification, and this origin would include the possibility of organic beings. No geogenetic hypotheses have been able to combine the facts of heat origin and stratification! But if we change the generally adopted opinion of Kant and Laplace, that the gases of the atmokosmos formed our globe by being condensed first into incandescent liquids, and finally into crystals, we may combine all the facts.

It is often found that we get out of hot gases mostly crystals, which partly by chemical reaction, become at first incandescent, and even quartz, feldspar, granite, and some iron minerals that we find in the granite, are known to be produced crystallised out of gases. Other facts prove that these Laurentian minerals must have originated between white and red heat.

In the origin of glaciers we have an analogy for the agglomeration of the incandescent crystals into the first earth-crust without melting, only by baking together, as being somewhat plastic, the crystals of snow harden together into ice, driving out the air between the crystals and losing their crystallised surface, assuming also sometimes Eozoon-like forms. Glaciers not seldom show stratifications, especially in the upper part formed by temporary snow-falls. As on the top of the glacier the snow-crystals lie yet ununited, so the minerals of the Laurentian period were certainly lying ununited upon the surface, and became afterwards hydrated together, when the earth-crust was cool enough, so that we find them in the post-Laurentian period much more mixed and with products of neptunic erosion.

OTTO KUNTZE

Leipzig-Eutritzsch, August 2

Unobserved Impressions

A NOTE to Mr. Mivart's address in the Biological Section of the British Association contains the following:—

"Having gazed vacantly through a window we revert to the pages of a manuscript we may be writing and see there the spectra of the window bars we had before unconsciously seen. Here the effect on the organism must have been similar to what it would have been had we attended to it—i.e., it was unfelt sensation" (NATURE, vol. xx. p. 399).

The last words induce me to mention what I believe I have often observed but have hitherto presumed to be well known in psychophysics, because though they are not inconsistent with it they seem to show that it had escaped the speaker; namely, that an unobserved impression produces a much stronger effect on the organism immediately impressed than an observed impression. Of course the observation cannot be experimentally prepared; but if any one who experiences a case like that

described by Mr. Mivart will allow the image to fade and then try to form another of the kind, he will be struck I believe by the inferiority of the voluntary one.

The phrase "unfelt sensation" suggests questions I wish to keep clear of; but the phenomenon appears to me interesting, because it plainly shows that work which would be done on the retina, or on something, by an unobserved impression, is done elsewhere by an observed one.

C. J. MONRO

Chesterfield, August 24

Insect-Swarms

A WONDERFUL flight of insects has passed over here to-day, consisting of the butterfly *V. cardui* and the moth *P. gamma*. They all came from the sea from the north-west and passed over the land to the south-east. I first noticed the flight at 7.30 A.M. The morning was bright and sunny with a light wind a little south of east. Great numbers of *V. cardui* were soaring at all heights, up to at least 150 feet, above and between the poplars which surround the house in which I am staying; all were going leisurely to the south-east; lower down *P. gamma* more erratic in its flight, was going in numbers in the same direction. I went down on to the grassy slope above the shore cliff. The blackberry blossoms were covered with *V. cardui* and *P. gamma*, three or four on a flower, the fussy moths much disturbing the more sedate butterflies, but each bent on holding its own. With scarcely an exception they took flight in a south-east direction when disturbed or when satisfied with their often, I fear, vain search for food. I stepped fifty paces from a clump of dark firs at right angles to their line of flight and counted the butterflies which passed for two intervals of two minutes; the numbers were 95 and 108, but I probably missed some of the higher ones. On the shore at 10 o'clock I counted 73 in one minute pass a space 50 paces in width; at 11.45 in one minute 50 passed the same space. The numbers of *P. gamma* were more difficult to ascertain owing to their smaller size and more erratic flight, but as they all flew very low on the shore, not more than a foot or two at most above the water or sand, I stepped 20 paces and tried to count the moths passing within those limits with the result—one minute 32 moths, two consecutive minutes 18 moths, again two minutes 120 at least. In the second interval a strong gust of wind checked the flight altogether, and in the third interval the moths came so fast that I missed many I feel sure. The *P. gamma* were evidently much exhausted; while bathing I saw several floating on the surface of the water, which took flight when touched or crawled on to a finger presented to them; some settled on me and on others while we were bathing. At 12 o'clock I passed uninterruptedly through the flight while walking from Trouville Harbour for a distance of two kilometres northwards along the shore. There was then an occasional white butterfly (*Pieris*) in the flight, and I also noticed two dragon-flies coming from the sea and following the same direction as the other insects; I noticed other dragon-flies with the flight inland, but they abound here. Had those coming from the sea accompanied the flight throughout as hawks are said to follow the flights of birds on which they prey? From the shore I climbed up the cliff, the grassy slopes above it were swarming with *P. gamma* and *V. cardui*, nearly every flower having one visitor at least. At 1.15 P.M. *P. gamma* passed over in undiminished numbers, but *V. cardui* was not so abundant. At 5.30 I rode parallel with the coast line along the Honfleur road to a point rather more than 10 kilometres from Trouville, passing through an uninterrupted flight of *P. gamma* all the way, but no *V. cardui*, though the butterfly still abounded on the blackberry and other blossoms by the roadside. Throughout the last two kilometres the moths were much fewer in number, but had not quite disappeared when I turned back. *P. gamma* generally flew lower than *V. cardui*, but the force which impelled them in one direction, as if their bodies were magnetised and their north pole was in the south-east, was so strong that when they met an obstruction to the course of their flight they went often over it not round it. While riding I noticed that they rose up and flew over isolated buildings, and I was curious to see whether they would do the same with a church tower. As I passed through Villerville, three came over the top of the church tower, and again at Criquebeuf, three fluttered up the wall, and flew over the church tower as I passed it. At 8 P.M. I went up on to the roof of the house; the moths were then flying up the front of the house and over the roof in great numbers. The flight of *P. gamma* continued to pass the

house in which I am writing, without interruption, from 7.30 A.M. till dark, and are now at 11.30 P.M., flying in at the open window, so as to be a perfect nuisance. They are still tired moths, for they soon settle; there are certainly many hundreds in the dark corners and along the cornice.¹ My children tell me that numbers of the moths were lying dead on the dry sand above high-water mark.² They collected some for a tame young magpie, which has been very happy all day among the flower-beds in the garden catching *P. gamma*, which, under ordinary conditions, would be far too wide awake for him.

How far the flight extended south of Trouville I do not know, but the number of insects which have passed from sea to land here to-day must be very great. Assuming that one *P. gamma* passed over each metre of shore line each minute, an estimate below the mark at all points to which my observation extended, and assuming the flight to have extended 10 kilometres along the shore, as I ascertained that it did during the evening, nearly 8,000,000 of *P. gamma* passed from sea to land between 7.30 A.M. and 8.30 P.M.

All the insects which I caught or looked at on flowers were in perfect condition.

Where have all these insects come from? Has the flight been noticed in England? *V. cardui* was exceedingly abundant here in June and throughout July, indeed it was the only butterfly to be seen in any numbers. Its larvæ have been feeding in tolerable numbers on the thistles and other plants, and some few fresh specimens appeared before the flight of to-day, but I think there is no doubt the insects which formed to-day's flight were not bred here. Why should the moth and the butterfly come together? Here they were flying against or nearly against, the wind, although they may have started with a favourable wind. Where will they go to? If they go far, what influence will they have on cross-fertilisation? The quantity of pollen which they will carry onwards from the myriads of flowers they have visited will be immense. Perhaps other observers may answer some of these questions. J. CLARKE HAWKSHAW

Trouville, Calvados, France, August 12

P.S.—The flight still continues this morning, August 13, 10 A.M.; *V. cardui* quite as abundant as yesterday.

P.S. No. 2.—The flight of *V. cardui* and *P. gamma*, described in my letter of August 12 ceased about 12 A.M. on the 13th. At 11 A.M. I counted forty-six and twenty-four *V. cardui* on the shore passing over a space of fifty yards in width, in two intervals each of two minutes. Judging from their number, the *V. cardui* have not remained here; on the other hand, I think many of the *P. gamma* have. On the 14th a large clearing in the forest of Tonques, about two miles inland, was alive with them. The flowers of the wood-sage appeared to be the great attraction there. I noticed many *P. gamma* lying dead on the roads inland, all in perfect condition. I believe that these moths died of starvation. The moths which flew into the house on the evening of the 12th were all more or less sluggish in the morning. There were more than 400 on one window, many of which readily took food offered to them in the form of syrup, and I induced a number of those in the forest to come on to my finger and suck up syrup.

What I have seen leads me to make the following suggestions as to the cause of these migrations of lepidoptera.

When a favourable season produces a great swarm of insects numbers would die from want of food if they remained where they came into existence, as the number of food-producing flowers is limited. To move off in some direction would be a necessity, and in time the impulse to migrate would become instinctive as soon as the want of food was felt, or even the presence of a crowd of their fellows. It would seem that the supply of food might be most readily found if the insects moved off in all directions, that is, spread from the centre of scarcity; but many moths seek their food by scent, and on that account generally, I believe, fly against the wind. Many facts might be given to show how acute the power of scent in moths is. Whether butterflies seek their food by scent or not I do not know; some are certainly attracted by strong odours, *Apatura iris*, for instance. At any rate, I think a hungry moth would fly against the wind, and so the general direction of a flight of moths might be determined.

Here both butterflies and moths searched the first flowers they came to after leaving the sea. The first comers would go on

¹ I have counted 200 on one part of the cornice.

² Possibly killed by the heat of the sand, on which they settled in an exhausted state.

refreshed, but the later ones merely wasted their energy in a fruitless search, and many of the moths fell dead by the way.

In the case of the flight I have described, a double necessity for the migration would have arisen if the butterfly and the moth came into existence at the same time as, seeing their fine condition, they most probably did. As both appeared to search the same flowers, the dearth of food at their centre of departure would more speedily have arisen.—J. C. H.

August 23

Animal Rights

MR. ROMANES'S parallel is as unsound as amusing. If a physiologist claimed to vivisect his children "on the plea that it was for this purpose that he had begotten them," we should tell him that the legal admission of such pleas would undermine human society. But in the killing of pigs for food no undermining of human society is involved. Moreover, we know that men breed pigs only to kill them, but that men breed children from entirely different motives; we should answer the physiologist that his plea was impossible of proof, that all human experience negated its probability, and that consequently it could not be admitted to overrule his children's presumptive right of life.

Mr. Romanes repeats his amazing proposition in morals, that "if we have a moral right to slay a harmful animal in order to better our own condition, it involves an inconsistency to deny that we have a similar right to slay a harmless animal, if by so doing we can secure a similar end." Then, if we have a moral right to slay harmful Zulus to better our own condition, we have a similar right to slay harmless Eskimos, if by so doing we can secure a similar end!

Mr. Romanes says that I did not attempt to meet one of his criticisms. Had I thought I might, I would have met them all; it does not take long. He thinks a lobster, to whom might is right, could not convince a philosopher that the latter had no right to eat him. Then I may pick a thief's pocket? He next admits that the lobster might appeal to the philosopher's morality, but asks why "the right of an edible animal to live is superior to that of an eating animal to kill?" Then the right of a robbable man to his money is not superior to the right of a man who uses money to rob him? And I, who am edible, have no more right to live than a cannibal has to eat me? Lastly, Mr. Romanes makes his philosopher say that he prefers lobster salad and roast lamb to boiled snakes and rat pie. Preferences are not rights, but if they were I have not suggested that the latter diet should supersede the former; and so my withers are unwrung.

EDWARD B. NICHOLSON

[*Ergo* the rights of a pig are *not* the same as those of a baby, which is just the point which my purposely unsound parallel was intended to show. It is for Mr. Nicholson to prove that the parallel is *sound*, if he is to sustain his "erroneous premiss," that the rights of men and animals are identical (the objection as to "motive" I ignore, because on the erroneous premiss in question the physiologist's motive might be sincerely stated and adequately proved as a motive by a declaration, say, in the marriage settlements). Instead of doing so, however, he alludes to one important difference between the rights of an animal and those of a man—the difference, namely, which arises from the latter being a member of human society. And this difference is in itself sufficient to nullify the force of all his rejoinders. Only on Mr. Nicholson's own supposition, that the rights of all living things are identical, could any of my propositions made with reference to animals be tested by their applicability to men. But this is just the supposition which I regard as absurd, and because it seems to me that ethical doctrine is here sufficiently patent—viz., that man as an intellectual, moral, and social being has rights additional to those of a merely sentient being. I will not take any further part in this correspondence.]

GEORGE J. ROMANES

Alpine Clubs

IN your account of the late conference of Alpine clubs, held at Geneva, there is one little omission which, as interesting to the scientific world generally, I beg leave to remedy.

It was suggested by your humble servant that a re-publication of de Saussure's "*Voyages dans les Alpes*" would be an appropriate memorial of our little congress at the city of which he was, I may say yet is, so bright an ornament. My plan was to